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Cowpeas

FOR OKLAHOMA

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OKLAHOMA AGRICULTURAL EXPERIMENT STATION
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Choosing a Variety

Much of the cowpea seed now available for planting is mixed as to variety, and there is very little standardization of varietal names. Therefore it is difficult to discuss varieties without confusion.

The list of recommended varieties given below is based primarily on the results of the variety trials reported herein. However, some allowance has been made for other factors, such as the demand for certain types (for example, blackeyed types for canning) and the probable availability of seed. (Often, indeed, it will be necessary to buy whatever seed is available.)

Where choice is possible, some help in making a selection can be obtained from the discussion of varieties on pages 9 to 13, and the tables showing yield performance and disease resistance.

Disease susceptibility is an important consideration. Preference should be given where possible to those varieties showing resistance, as listed in Table V.

Recommended Varieties*

FOR FORAGE—

Field Types: Buff, Brabham or Brabham K-892, Iron or Iron K-329, Red Ripper K-711, and Victor or Victor K-798.

Edible Types: Cream Crowder, Blackeye White Crowder, Early Ramshorn Blackeye, and Early Wilt Resistant Ramshorn Blackeye.

FOR SEED—

Field Types: Early Red, New Era, Buff, and Victor K-798.

Edible Types: Cream Crowder, Blackeye White Crowder, Early Ramshorn Blackeye, Cream Crowder, and Virginia Blackeyes. (Market demands might modify this list.)

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* Numbered varieties are improved strains of the named variety, selected for yield and disease resistance.

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Cowpeas

For Oklahoma

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The cowpea is such a common crop in the South that it sometimes fails to get the respect it deserves. Little attention is paid to selection of varieties for planting. Yet varietal comparisons made by the Oklahoma Agricultural Experiment Station during the past 20 years show considerable differences among cowpea varieties in yields, resistance to disease, and suitability for different uses.

This bulletin summarizes results of cowpea variety trials made between 1924 and 1943 at Stillwater, between 1944 and 1948 at Perkins, and at both Heavener and Lone Grove for the two periods 1930 to 1933 and 1943 to 1948.* It also includes a description of the varieties recommended for Oklahoma, a discussion of diseases affecting cowpeas, and some suggestions about growing and using this crop.

Variety trials are being continued at Perkins, Heavener, and Lone Grove, with about 50 varieties being tested at each location. In addition, breeding nurseries at Stillwater include experimental strains developed in cooperation with station plant pathologists in a search for improved yield and disease resistance.

Results of Variety Tests

Cowpeas are divided on the market and in seed catalogs into field and edible types, and are so divided in this report. Edible types are entirely satisfactory for use as a field cowpea.

YIELDS

Tables I and II show average yields of the different varieties tested at one time or another since 1924. These yield figures are an

* A detailed report of these trials is given in Okla. Agri. Exp. Sta. Manuscript Report No. MR-6, available in microfilm or photostat form, or through inter-library loan.

average of the Stillwater-Perkins, Heavener, and Lone Grove tests. Differences between the locations were not great enough to warrant showing them separately.

Table I.—Average Yields of Field Varieties; All Tests.

Variety	No. of "station years"*	Average yield	Percent of Whippoorwill**
	SEED (bushels per acre)		
Early Red	29	9.69	154.3
New Era	39	9.62	153.2
Buff	5	9.28	147.8
Victor K-798	8	9.16	145.9
Groit	38	7.94	126.4
Potomac (or Calico)	24	7.86	125.2
Buff (Early)	12	7.77	123.7
Holstein	25	7.74	123.2
Victor	23	7.73	123.1
Chinese Red	35	7.69	122.5
Early Red K-736	8	7.39	117.7
Blacks	37	7.32	116.6
Columbia	17	6.86	109.2
Brabham	34	6.84	108.9
Clay	38	6.74	107.3
Whippoorwill	40	6.28	100.0
Iron K-329	8	6.21	98.9
Brabham K-892	8	5.59	89.1
Iron	22	5.45	86.8
Red Ripper K-711	8	5.40	86.0
Red Ripper	30	3.92	62.5
Suwanee	2	2.08	33.1
	HAY (tons per acre)		
Buff	4	1.80	160.7
Victor K-798	8	1.68	150.0
Iron K-329	8	1.65	147.3
Brabham K-892	8	1.63	145.5
Brabham	39	1.46	130.4
Iron	27	1.44	128.6
Red Ripper K-711	8	1.43	127.7
Victor	25	1.43	127.7
Suwanee	2	1.36	121.4
Columbia	19	1.25	111.6
Early Red K-736	8	1.20	107.1
Red Ripper	33	1.19	106.2
Early Red	31	1.17	104.5
Blacks	39	1.14	101.8
Clay	38	1.14	101.8
Whippoorwill	42	1.12	100.0
Potomac (or Calico)	23	1.11	99.1
Groit	40	1.07	95.5
New Era	41	1.06	94.6
Holstein	26	.95	84.8
Chinese Red	38	.81	72.3
Buff (Early)	15	.78	69.6

* Number of years times number of locations. For example, Victor K-798 was grown five years at Perkins and three years at Lone Grove for a total of eight "station years."

** Whippoorwill was chosen as the variety with which others would be compared merely because it had been tested for the greatest number of "station years."

Table II.—Average Yields of Edible Varieties; All Tests.

Variety	No. of "station years"*	Average yield	Percent of Cream Crowder**
	SEED (bushels per acre)		
Dixie Queen Purple Pod	3	8.41	125.7
Arlington	28	8.39	125.4
Brown Crowder	28	7.83	117.0
White Browneye Crowder	18	7.77	116.1
Speckled Crowder	14	7.36	110.0
Early Ramshorn Blackeye	7	7.32	109.4
Dixie Queen Browneye	6	7.18	107.3
Cream Crowder	26	6.69	100.0
Giant Wilt Resistant Ramshorn Blackeye	7	6.68	99.8
Rice	8	6.14	91.8
Virginia Blackeye	31	5.70	85.2
Large Virginia Blackeye	19	5.62	84.0
Lady Edible	14	5.41	80.9
Sumptuous	15	5.38	80.4
Blue Goose	27	5.33	79.7
Dixie Queen	5	4.93	73.7
Early Wilt Resistant Ramshorn Blackeye	9	4.91	73.4
Extra Early Blackeye	10	4.62	69.0
Blackeye 7711	9	4.19	62.6
Browneye Purple Pod	1	3.94	58.9
Blackeye White Crowder	7	3.44	51.4
Silver Skinned Crowder	1	3.32	49.6
Blackeye No. 7	2	3.22	48.1
Blackeye 8152	1	3.11	46.5
	HAY (tons per acre)		
Dixie Queen Purple Pod	3	1.38	106.1
Cream Crowder	29	1.30	100.0
Blackeye White Crowder	7	1.27	97.7
Early Ramshorn Blackeye	7	1.16	89.2
Early Wilt Resistant Ramshorn Blackeye	9	1.14	87.7
Giant Wilt Resistant Ramshorn Blackeye	7	1.10	84.6
Lady Edible	16	1.09	83.8
Arlington	31	1.06	81.5
Blackeye 7711	9	1.06	81.5
Blue Goose	25	1.04	80.0
Rice	8	1.04	80.0
Extra Early Blackeye	10	1.03	79.2
Virginia Blackeye	33	1.03	79.2
Speckled Crowder	16	1.02	78.4
Browneye Purple Pod	1	1.01	77.7
Brown Crowder	28	.99	76.1
Large Virginia Blackeye	19	.95	73.1
Blackeye No. 7	2	.93	71.5
Silver Skinned Crowder	1	.93	71.5
Dixie Queen	5	.90	69.2
White Browneye Crowder	18	.84	64.6
Sumptuous	15	.81	62.3
Blackeye 8152	1	.74	56.9
Dixie Queen Browneye	6	.73	56.1

* Number of years times number of locations. For example, Lady Edible was grown six years at Stillwater and five years each at Perkins and Lone Grove for a total of 16 "station years."

** Cream Crowder was chosen as the variety with which others would be compared both because it is a generally known variety and also because it had been tested for a large number of "station years."

The tables represent a total of 40 "station years." Some varieties were planted only a few years at one location. Others were planted nearly every year at all locations. Therefore the tables show the number of station years included in each average, as an indication of the extent to which each variety has been tested.*

Yields have varied greatly from year to year in these tests. Seed yield, especially, has fluctuated widely. The extreme annual differences are illustrated by Table III, showing the annual average for all varieties in the Stillwater-Perkins test from 1939 to 1948. Similar annual variations are found in results of the earlier trials at Stillwater and in the tests at Heavener and Lone Grove.

The field types have produced larger yields of both hay and seed than have the edible types. This may be seen in Table IV, which compares some of the higher yielding varieties of both types. However, the more productive of the edible types make yields which are high enough for profitable production.

Varieties which produce high yields of hay often make low seed yields, and vice versa. Among the field varieties, only Buff, Victor, and Victor K-798 rank in the top ten in both seed and hay yield (Table I). Among the edible varieties, five were in the top ten in both seed and hay yields: Dixie Queen Purple Pod, Arlington, Early Ramshorn Blackeye, Cream Crowder, and Giant Wilt Resistant Ramshorn Blackeye (Table II).

DISEASE RESISTANCE

Table V gives a preliminary and strictly tentative classification of cowpea varieties according to their susceptibility to bacterial blight and bacterial canker. This classification is based on disease readings made on the variety trials at Perkins in 1945, 1947 and 1948, and on those at Heavener and Lone Grove in 1945 and 1948.**

Mosaic was first found in the cowpea variety trials in 1945, on only a few varieties. Since then, it has been found to be severe on certain varieties, whereas other varieties appear resistant but not immune.

No variety has been found completely resistant or immune to bacterial canker, bacterial blight, or mosaic. However, the differences between varieties are enough to indicate the possibility of developing resistant varieties by breeding; and such a breeding program is now under way at this Station.

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* "Station years" is calculated by totalling the number of years the variety tested at each location. For example, a variety tested five years at Lone Grove and eight years at Stillwater was tested a total of 13 "station years."

** These readings were made by D. A. Preston, at that time assistant plant pathologist at this experiment station.

Some Notes on Cowpea Varieties

Discussion of cowpea varieties is difficult because variety names are not standardized, and much of the seed available is mixed. An effort is now being made to classify the numerous varieties of this crop, and to get pure seed of strains that show value for Oklahoma.

The following comments covering the recommended varieties, and others now being grown in this State, may be of some help in interpreting the yield and disease data reported in the tables. The varieties carrying "K" numbers are improved strains of the named variety, selected for disease resistance and better yield.

FIELD VARIETIES

Blacks are a type of cowpea, rather than a variety; a number of very similar black-seeded strains are

Table III.—Annual Average* Yields of All Varieties Tested; Stillwater and Perkins, 1939 to 1948.**

Year	Field varieties		Edible varieties	
	Hay yields (tons per acre)	Seed yields (bu. per acre)	Hay yields (tons per acre)	Seed yields (bu. per acre)
1939	1.66	8.02	1.50	8.04
1940	1.26	18.49	1.22	19.91
1942	1.08	18.50	.93	20.20
1943	.46	3.51	.41	1.61
1944	1.39	6.54	1.35	3.30
1945	1.03	10.00	.94	8.90
1946	.84	11.08	.80	9.36
1947	1.02	4.18	1.08	3.68
1948	2.56	9.52	2.16	6.57

* Each figure represents an average of from 12 to 20 varieties except edible varieties in 1939 and 1940, when only 6 of that type were included in the tests.
** Except 1941, when cowpea variety trials were not planted.

Table IV.—Highest-yielding Varieties, by Types; All Tests.

Hay yields (tons per acre)		Seed yields (bushels per acre)	
Field Types			
Buff	1.80	Early Red	9.69
Victor K-798	1.68	New Era	9.62
Iron K-329	1.65	Buff	9.28
Brabham K-892	1.63	Victor K-798	9.16
Average	1.69	Average	9.44
Edible Types			
Cream Crowder	1.30	Arlington	8.39
Blackeye White Crowder	1.27	Brown Crowder	7.83
Early Ramshorn Blackeye	1.16	White Browneye Crowder	7.77
Early Wilt Res. Ramshorn Blackeye	1.14	Speckled Crowder	7.36
Average	1.22	Average	7.84

DISEASE CLASSIFICATION

Table V.—Tentative Classification of Cowpea Varieties According to Susceptibility to Bacterial Canker and Bacterial Blight.

***—Most susceptible group. **—Intermediately susceptible group. *—Least susceptible group.

	Susceptibility group for:	
	Bacterial blight	Bacterial canker
Field Types		
Black	***	**
Brabham	*	*
Brabham K-892	*	*
Buff	**	*
Chinese Red	***	***
Clay	***	**
Clay K-713	***	**
Columbia	***	**
Early Red	***	**
Early Red K-736	***	***
Groit	***	***
Holstein	***	*
Iron	**	*
Iron K-329	*	*
New Era	**	*
Oklahoma Black	**	*
Potomac	***	***
Red Ripper	***	**
Red Ripper K-711	**	*
Red Whippoorwill	***	***
Suwanee	**	*
Victor	*	*
Victor K-798	**	*
Whippoorwill	***	***
Edible Types		
Arlington	***	**
Blackeye No. 7	***	***
Blackeye 7711	***	***
Blackeye 8152	***	*
Blackeye White Crowder	**	*
Blue Goose	***	**
Brown Crowder	***	*
Browneye Purple Pod	**	*
California Blackeye	**	**
Cream Crowder	***	***
Dixie Queen Purple Pod	**	***
Dixie Queen Browneye (Straw)	***	**
Extra Early Blackeye	***	***
Early Wilt Resistant Ramshorn Blackeye	***	***
Early Ramshorn Blackeye	***	***

Table Continued on Next Page

Table V cont'd.

	Susceptibility group for:	
	Bacterial blight	Bacterial canker
Giant Wilt Resistant Ramshorn Blackeye	***	***
Lady Edible	***	**
Large Black	**	*
Large Virginia Blackeye	***	***
Purple Hull 3445	**	*
Purple Hull 5036	**	*
Red Speckled Crowder	***	*
Rice	***	**
Speckled Crowder	***	**
Sumptuous	***	***
Virginia Blackeye	***	***
White Browneye Crowder	***	**

sold under the name of Blacks. Some black-seeded varieties are classed as edible peas. The strain carried in the Station's tests was only average in hay and seed yield, and medium to highly susceptible to disease.

Brabham stands near the top in hay yields, but has made only average yields of seed. It has good resistance to both canker and blight. The improved strain, Brabham K-892, is equally disease resistant, and somewhat higher in hay yield; but it has averaged about a bushel less seed per acre.

Buff has been tested only a short time, but it stands high in yield of both hay and seed and has good disease resistance.

Chinese Red is an early maturing, bush-type cowpea, classed as both field and edible, which is readily combined with little loss. Chinese Red for some years gave promise of being an outstanding pea for Oklahoma, but in recent years it has developed almost 100 percent susceptibility to bacterial canker. However, its other good qualities give it a place in Oklahoma, especially if its bush type of growth and good seed yield can be combined with resistance to canker and other diseases. This combination is a principal objective of the current cowpea breeding program.

Early Red is a very early maturing, vining type variety. It ripens its seed rapidly and is usually fully matured before other varieties have begun to ripen. It is highly susceptible to bacterial canker and several other cowpea diseases. Yields have been slightly better than New Era. New Era is considerably more disease resistant.

Groit is a medium to late maturing variety. It has medium to high susceptibility to both bacterial canker and blight. It ranks third in seed yield among those varieties which have been tested for a fairly long period of time.

Holstein is a widely grown black and white cowpea of semi-Crowder

type. The plants are semi-upright vining type. It is classed as "least susceptible" to canker but "most susceptible" to blight. Seed yields have been somewhat above average, but hay yields have been low.

Iron has made better than average hay yields, but low yields of seed. It is rated "least susceptible" for canker and intermediately susceptible to blight. The improved strain, Iron K-329, has made somewhat better yields of both seed and hay, and seems to be somewhat more resistant to blight.

New Era is a medium to early cowpea which is widely grown in Oklahoma, and is one of the best seed varieties for this State. It is classed as "least susceptible" for canker and intermediately susceptible to blight, but is sometimes badly damaged by mosaic. Seed yields average so near the first-place Early Red variety that there is no practical difference, and it has much better resistance to canker and blight. The hay is fine textured and cures quickly, but is difficult to mow because of the extreme vining habit of growth. Hay yields have been low.

Potomac (also called Calico) is a medium to late maturing, semi-bush type. Though its seed yield has been well above average, it is highly susceptible to both canker and blight and has made rather low yields of hay.

Red Ripper K-711 appears to be considerably better than the common Red Ripper, in both seed and hay yields. It also is less susceptible to both canker and blight. Seed yields of both the older and improved strain are low, but the K-711 is well above average in hay yield.

Victor is a medium to late maturing variety. It is rated "least susceptible" for canker and intermediately susceptible to blight. Seed and hay yields are above average; and the improved strain, Victor K-798, has ranked near the top in both seed and hay yields during the short time it has been tested.

Whippoorwill, one of the older and better known varieties, is highly susceptible to both canker and blight. It is considerably below average in yields of both hay and seed.

EDIBLE VARIETIES

Arlington has made good yields of seed, but is not recommended because it is difficult to harvest. The seeds are borne in short pods, which greatly increases the labor of hand-picking; and the low-growing medium viny habit of growth makes this variety unsuitable for combining. It is therefore not on the recommended list.

Blackeyes are a popular type which includes numerous varieties and strains. The blackeye type is most in demand for table use and commercial canning, and therefore is on the recommended list despite the tendency of all blackeye types to be low in yield and highly susceptible to diseases. The low yields are principally due to poor pollination; in most cases pods are only partially filled.

Blackeye No. 7 is somewhat less likely to suffer from nematode damage than are other blackeyed strains. Early Ramshorn Blackeye and Early Wilt Resistant Ramshorn Blackeye have made good forage yields despite being classed as "most susceptible" to both bacterial canker and bacterial blight. Numerous strains of Virginia Blackeye are available, and seed is easy to get; but the strain of Virginia Blackeye grown in the Station's trials has been only average in seed and hay yields. Extra Early Blackeye is classed as highly susceptible to both canker and blight, and yields of both seed and hay have been average or below.

Crowders are a type including several varieties. Brown Crowder (also called Sugar Crowder or Brown Sugar Crowder) and Cream Crowder are old, established varieties, and are generally considered along with the blackeye strains as being most desirable for table use. Seed is easy to obtain. The Crowders, generally speaking, have made somewhat better seed yields than the Blackeyes. A White Browneye Crowder has made good seed yields but is undesirably late in maturity. In hay yields, the Cream Crowder has done considerably better than the Brown Crowder, despite being more susceptible to canker. A Blackeye White Crowder has made good hay yields during a short period of testing, but seed is not generally available. The Speckled Crowder strain grown in the variety trials apparently is not a pure variety.

Dixie Queen seed obtained for the variety trials apparently included a number of different types. One of them, a purple-pod strain, looks promising; but not enough data are available to place it on the recommended list.

Diseases of Cowpeas*

Cowpeas are subject to several diseases, but only three are of serious importance in Oklahoma. They are mosaic, bacterial blight, and bacterial canker. Any one of these three can cause considerable reduction in yield and quality of hay and seed, and in some cases may destroy the entire crop.

All three of these diseases are carried over in the soil, on plant residues in the field, and on the seed. They are spread from plant to plant by wind and cultivation. Development of resistant or immune varieties of cowpeas appears the most promising method of control, and plant breeders are now seeking such varieties. Meanwhile, the use of certified seed, which is field inspected for freedom from disease, would help reduce damage from these diseases.

Mosaic attacks the leaves of cowpeas. When very severe, the leaves, stems, and pods are stunted and deformed. Mild cases may be barely noticeable, but in severe cases the deformity of the leaves is quite

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* Dr. R. C. Young, associate plant pathologist, provided much of the information presented in this section. He also reviewed the discussion of disease resistance on page 8 and made several helpful suggestions.

characteristic. Mosiac may be less damaging to cowpeas than either of the other two principal diseases, and many of the best field varieties apparently are resistant or tolerant.

Bacterial blight also attacks the leaves. Light brown spots appear on the leaves following periods of damp, cool weather. These spots may enlarge until they merge and affect the entire leaf. Defoliation often occurs following a severe infection.

Bacterial canker is a comparatively new disease, or at least one which has only lately been reported in Oklahoma.* The disease can be recognized by a brown cankered area on the stem, usually just above the ground. As it progresses the stem will be split open and the plant either killed or so weakened that it is easily broken off and destroyed.

No variety has yet been found immune to bacterial canker.

Uses of Cowpeas

Cowpeas have a wide variety of uses: as human food, as livestock feed, as hay, and as a soil-improving crop.

AS A FOOD

The cowpea, especially the blackeye and crowder types, has been a staple in the Southern diet for at least a hundred years. It was grown for human food in very early times in Asia, Africa, and European countries along the Mediterranean. Interest in cowpeas as a food has increased considerably in Oklahoma in recent years because of the demand created by canneries.

The popularity of the cowpea as a food is well supported by the nutritive value of the seeds, whether in the pods, green-shelled, or dry, according to results of research** now in process of publication. In the snap stage, the pods are rich in carotene (provitamin A) and ascorbic acid (vitamin C). The fresh, green-shelled peas are a good source of protein, carbohydrate, phosphorus, and of the vitamins thiamin (B_1) and ascorbic acid. The dry, mature seeds are excellent sources of protein, carbohydrate, phosphorus, and thiamin. Thiamin and riboflavin (vitamin B_2) are found at all three stages of growth; but they are present in largest amounts in the mature seeds, which contain about four times as much thiamin as riboflavin.

AS LIVESTOCK FEED

Mature, dry cowpea seed can be used as a livestock feed if desired. In a recent feeding trial at the Oklahoma Station 100 pounds of ground Chinese Red cowpeas was equal in value to 80 pounds of cottonseed cake for fattening beef calves (with cowpeas at $50 per ton

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* For more information about bacterial canker of cowpeas, see Okla. Agri. Exp. Sta. Bul. B-34.

** By the state experiment stations in Oklahoma and five other southern states in cooperation with the U. S. D. A. Regional Vegetable Breeding Laboratory at Charleston, S. C. The Oklahoma Station was represented by Ruth Reder, associate research chemist, and H. B. Cordner, horticulturist (vegetables).

and cottonseed cake at $67 per ton.)* The cowpeas analyzed 24.25 percent protein, 1.22 percent fat, 65.80 percent carbohydrate, 4.78 percent fiber, and contained about half as much calcium and phosphorus as the cottonseed cake.

FOR SOIL IMPROVEMENT

Cowpeas will provide a ton or more of dry organic matter to plow under, and if properly inoculated will add considerable nitrogen to the soil. Most Oklahoma soils are already fully inoculated, so inoculation of the seed is seldom necessary. If the seeds are picked green or are harvested as dry seed, the vines can still be plowed under to add organic matter and nitrogen.

AS HAY

Cowpea hay is palatable and nutritious if properly cured. It contains slightly more protein than soybean or mungbean hay. One to 1½ tons of hay per acre can usually be made on soils of medium fertility. The hay is difficult to cure, but no more so than hay of soybeans or other large-plant legumes.

* One season only. See Okla. Agri. Exp. Sta. Pub. MP-17, pp. 73-79.

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